



# Sparkling interest: A design framework for mobile technologies to promote children's interest in nature

Saba Kawas<sup>a,\*</sup>, Sarah K. Chase<sup>b</sup>, Jason Yip<sup>a</sup>, Joshua J. Lawler<sup>b</sup>, Katie Davis<sup>a</sup>

<sup>a</sup> The Information School, University of Washington, Seattle, WA 98195, USA

<sup>b</sup> School of Environmental and Forest Sciences, University of Washington, Seattle, WA 98195, USA



## ARTICLE INFO

### Article history:

Received 29 June 2018

Received in revised form 17 December 2018

Accepted 29 January 2019

Available online 5 February 2019

### Keywords:

Child-centered design

Interest development

Outdoor mobile technologies

Design framework

Participatory design with children

Nature-based exploration

Interest-driven scaffolding

## ABSTRACT

Can a mobile app engage children in explorations of the natural world and promote their interest in nature? Drawing on theory related to interest development and research on mobile learning technologies, we derived a set of four design principles to support the development of children's personal interest in nature. We co-designed with 7 children ages 7–12 a set of interest-centered design strategies to implement each of the following principles: (1) personal relevance, (2) focused attention, (3) social interactions, and (4) opportunities for continued engagement. We applied these strategies to design *NatureCollections*, a mobile application that allows children to build, curate, and share nature photo collections. We conducted an in-situ case study with 18 children ages 7–11 years who used the *NatureCollections* app to take pictures of their natural surroundings. Qualitative indicators suggest *NatureCollections* succeeded in directing children's attention to and promoting close observation of the natural elements in their surroundings, and prompted playful, nature-related conversations with peers and parents.

© 2019 Elsevier B.V. All rights reserved.

## 1. Introduction

Globally, children are spending less time outdoors than the generations before them [1,2]. In 2016, U.S. children spent 50% less time than their parents playing in nature [2–4]. At the same time, a 2015 U.S. survey showed that children ages 7–13 spent approximately six hours per day using screen media entertainment, which excludes screen time spent for homework and while at school [5]. Spending less time in nature has negative implications for children's developing attitudes towards and interest in nature [6,7]. Indeed, a 2011 poll from The Nature Conservancy found that 49% of U.S. children reported a lack of interest in spending time in nature [8].

This state of affairs is problematic on both an individual and a societal level. On an individual level, a failure to develop an interest in nature may negatively affect children's nature-related science learning. Personal interest – characterized by concentrated attention, positive feelings, and a likelihood to re-engage with the same topic [9] – is an important dimension of learning, including science learning [9,10]. On a societal level, prior research has found a connection between individuals' positive perceptions of childhood experiences in nature and their positive attitudes and actions towards the environment as adults [11,12]. Reducing

habitat loss, a major driver of biodiversity loss, depends on these positive attitudes and actions [13,14].

Whether fairly or not, networked technologies are often seen as the source of our current problems [15,16]. At the same time, these technologies are increasingly used to design solutions to problems such as sleep deprivation [17], empathy decline [18], and decreased attention [19]. With respect to interest development, prior work has demonstrated that technological infrastructures can support interest-driven engagement and learning by allowing students to tailor activities to their personal interests and extend activities in unanticipated ways [20].

Work conducted in the field of mobile learning technologies leverages the affordances of mobile and networked technologies to engage children in outdoor settings. Although this work has yielded promising results with respect to promoting children's exploration of, and learning about, nature [21–26], it has not placed interest development at the center of design-based investigations. In fact, a persistent challenge surfaced by this work relates to children's tendencies to engage with their handheld devices rather than with their surroundings when they are in an outdoor setting or in front of a museum exhibit [27,28]. This is a particular problem for interest development, which requires focused attention to trigger and sustain it [9].

In the current work, we explore the potential for a mobile application to spark children's interest in nature. This work is motivated by prior research showing that the development of a sustained personal interest in a topic begins with an externally triggered situational interest [9]. Whereas a personal interest is an enduring

\* Corresponding author.

E-mail addresses: [skawas@uw.edu](mailto:skawas@uw.edu) (S. Kawas), [schase25@uw.edu](mailto:schase25@uw.edu) (S.K. Chase), [jjyip@uw.edu](mailto:jjyip@uw.edu) (J. Yip), [jlawler@uw.edu](mailto:jlawler@uw.edu) (J.J. Lawler), [kdavis78@uw.edu](mailto:kdavis78@uw.edu) (K. Davis).

predisposition to re-engage in a particular content, a situational interest arises in the moment and may be relatively fleeting if not supported beyond that moment [9,29]. We ask the following research questions: **RQ1**: *What are the design considerations to spark children's interest development in their natural surroundings?*; and **RQ2**: *In what ways can embodying these design considerations in the features of the NatureCollections app contribute to triggering children's situational interest in nature?*

Drawing on Hidi and Renninger's model of interest development [9] and prior research on mobile learning technologies [25, 30,31], we derived a set of four design principles to guide the design of technologically-enhanced interactions in natural settings that support children's interest development in nature. We then conducted several co-design sessions with children ages 7–12 to derive design strategies to implement our theoretically derived design principles. We embodied these strategies in the design of *NatureCollections*, a mobile application that encourages children ages 7–12 to explore nature through gamified challenges to create, curate, and share nature photo collections.

We conducted an in-situ evaluative case study with 18 children ages 7–11 in an outdoor setting, using the *NatureCollections* app. Our findings suggest that using *NatureCollections* can trigger a situational interest by: (1) encouraging children's directed attention to and close observation of the natural elements in their surroundings, and (2) promoting playful interactions with peers and parents around nature.

The main contributions of this work are: (1) an interest-centered design framework for mobile technologies to promote children's interest development in a topic, and (2) empirical insights from a case study that applied the interest-centered design framework to design, develop, and evaluate the *NatureCollections* app.

## 2. Related work

### 2.1. The connection between interest and learning

Interest is central to learning in any domain, including science [9,20,29,32]. Learners are more likely to focus on, commit to, and persist in a learning activity when they care about and find enjoyment in it – in other words, when they are *interested* in the activity. Interest-driven learning is characterized by self-motivated engagement in a topic over the short- or long-term [20,29]. A learner who engages in interest-driven learning feels personally connected to the topic and is able to make connections to prior knowledge and experiences [9,32]. Much of the research on interest-driven learning centers on informal learning contexts, such as after-school programs [10,33–35], museums [36], and science centers [37]. Compared to formal classroom settings, which often follow a predetermined structured curriculum, informal learning contexts afford greater freedom for learners to pursue their interests in a self-directed manner [20]. Though self-directed, interest-driven learning is also highly social [20,32].

We focus on interest development in nature-based informal settings as a central dimension of support for interest-driven learning about nature. The unstructured quality of natural settings lends itself to engaging learners in self-directed activities guided by their personal curiosities and inclinations. However, survey data suggests that when considering children's diminishing time in nature, a lack of interest is an important component [8]. Therefore, there is a need for interventions that promote children's interest development in nature, both to support nature-based science learning and to encourage children to become responsible stewards of the environment [11,12,14,38].

### 2.2. A theoretical model of interest development

The design of *NatureCollections* is theoretically informed by Hidi and Renninger's four-phase model of interest development [9]. The model highlights the importance of promoting focused attention and positive affect, and describes how an externally triggered situational interest can develop into a sustained personal interest through repeated engagement in personally relevant and socially supported experiences. We argue that Hidi and Renninger's model provides: (1) guidance for how to design technologies to support interest development, and (2) focus for how to observe children's development of interest-driven participation.

Hidi and Renninger define personal interest as a psychological state characterized by focused attention and positive feelings towards a particular content, as well as a predisposition to re-engage with the content repeatedly [9]. Interest differs from related constructs such as motivation, in that engagement is accompanied by a positive emotion (affective component), as well as perceptual and representational activities associated with engagement (cognitive component). The four-phase model of interest development describes how an internally driven personal interest emerges from an initial external stimulus. Although the model was developed with academic interest in mind, prior work has used it to study interest development in informal settings [38].

Each of the four phases in the model is distinct and sequential in its order of development and progress. In the first stage, a *triggered situational interest* results from the introduction of an environmental stimulus that is personally relevant, intense, or otherwise unexpected. This external stimulus sparks positive feelings and focused attention, which form the basis of a *maintained situational interest* when they are sustained over an extended period of time through meaningful interactions. Both a triggered and a maintained situational interest are externally supported by other people and/or structured tasks. Without such external support, an interest may become dormant or disappear altogether. During the course of repeated engagement with a particular content, an *emerging individual interest* develops as an individual starts to value the content based on prior experiences engaging with it. An emerging individual interest requires some external support in the form of encouragement from others and an environment that provides opportunities for re-engagement. Lastly, a *well-developed individual interest* results when an individual has formed an enduring predisposition towards a topic that is marked by deep positive feelings and accumulated knowledge.

Although each phase of Hidi and Renninger's model is distinct, they share common characteristics that contribute to and support interest development. These characteristics include *focused attention on personally relevant content*, *supportive social interactions*, and *opportunities for continued engagement*. We drew on these crosscutting characteristics to derive the four design principles that form the foundation of our interest-centered design framework. Because the characteristics appear in each phase of Hidi and Renninger's model, our interest-centered design framework – and, by extension, the *NatureCollections* app that we designed using the framework – addresses all four phases of the interest development model. In our initial evaluation of the *NatureCollections* app, we focused specifically on the first phase of interest development: a triggered situational interest. This decision was guided in part by the brief nature of our field test, as well as the fact that a triggered situational interest is a necessary precursor to further interest development.

### 2.3. Designing mobile technologies for nature exploration

Our work is also informed by prior research that leverages mobile technologies to engage children in nature-based learning experiences. This work aims to support learners in informal settings by using location awareness capabilities, social features, built-in data collection functions, and just-in-time prompts.

Download English Version:

<https://daneshyari.com/en/article/13424389>

Download Persian Version:

<https://daneshyari.com/article/13424389>

[Daneshyari.com](https://daneshyari.com)